ABSTRACT OF THE DISCLOSURE

The present invention discloses eleven reduced dimensionality (RD) triple resonance nuclear magnetic resonance (NMR) experiments for measuring chemical shift values of certain nuclei in a protein molecule, where the chemical shift values encoded in a peak pair of an NMR spectrum are detected in a phase sensitive manner. The RD 3D HA,CA,(CO),N,HN NMR and RD 3D H,C,(C-TOCSY-CO),N,HN NMR experiments are designed to yield "sequential" connectivities, while the RD 3D $H^{\alpha/\beta}$,$C^{\alpha/\beta}$,CO,HA NMR and RD 3D $H^{\alpha/\beta}$,$C^{\alpha/\beta}$,N,HN NMR experiments provide "intraresidue" connectivities. The RD 3D H,C,C,H-COSY NMR, RD 3D H,C,C,H-TOCSY NMR, and RD 2D H,C,H-COSY NMR experiments allow one to obtain assignments for aliphatic and aromatic side chain chemical shifts, while the RD 2D HB,CB,(CG,CD),HD NMR experiment provide information for the aromatic side chain chemical shifts. In addition, methods of conducting suites of RD triple resonance NMR experiments for high-throughput resonance assignment of proteins and determination of secondary structure elements are disclosed.